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RESOURCES COMMISSION

TOWN OF HARRISTON

ANNUAL REPORT

1966

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ONTARIO WATER RESOURCES COMMISSION

TOWN OF HARRISTON

ANNUAL REPORT

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ONTARIO WATER RESOURCES COMMISSION

TOWN OF HARRISTON

PROJECT NO. 62-S-123
65-S-185

ANNUAL REPORT

1966

July, 1967

Prepared by:

B. W. Hansler, P. Eng.,
Operations Engineer,
Division of Plant Operations.

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INTRODUCTION

This report presents the significant data on the operation of the Harriston Water Pollution Control System for 1966.

Included in this report is a brief history and description of the project, the normal operating procedure, a review of the operating characteristics of the waste stabilization ponds and a summary of the annual operating costs.

HISTORY

The Town of Harriston approached the Ontario Water Resources Commission to obtain assistance and advice in dealing with its disposal and pollution problems and signed a preliminary agreement with the Commission in December, 1958.

In July, 1961, the consulting firm of W.M. Veitch Associates was formally engaged by the Ontario Water Resources Commission to design sewage works for the Town of Harriston.

The agreement between the Town and the Ontario Water Resources Commission to finance, construct and operate the project was signed in April, 1964.

Construction of the sewage works began in May, 1964. The sanitary sewers and pumping station were installed by Cornell Construction Co., Ltd. The waste stabilization pond was constructed by Graham & Graham Construction Company.

The project has been in operation since December, 1964. Since start-up, neither the pumping station nor the waste stabilization pond facilities have been enlarged.

The total cost to design and construct the sewage works was $325,124.

DESCRIPTION OF THE PROJECT

The Town of Harriston is served by approximately 9,400 feet of sanitary sewers, varying in size between 8 inches and 15 inches, together with service connections and appurtenances.

The sewage collected by this system either flows by gravity or is pneumatically boosted to a wet well connected to a Robert Morse Corp. prefabricated underground pumping station. The pumping station on William Street discharges the sewage through approximately 2,300 feet of 8 inch forcemain to three waste stabilization pond cells totalling 28 acres.

The pumping station is equipped with two centrifugal sewage pumps with an automatic control system, electrical switch gear, heater, dehumidifier, exhaust system and sump pump. The equipment operates automatically and apart from repairs, requires only periodic inspection to assure continued operation.

Oxygen in the waste stabilization pond is supplied through photosynthesis by a family of simple plants, collectively termed algae, and by absorption from the atmosphere. Aerobic (oxygen using) bacteria in the pond break down and stabilize the organic matter.

When the pond surface is covered with ice and snow, free oxygen is not available. Anaerobic (non-oxygen using) bacteria and sewage fungi predominate and under these conditions the sewage becomes septic. During the spring ice break-up period when conditions are changing from anaerobic to aerobic, septic conditions prevail.

With aerobic treatment, the pond effluent should have a greenish colour indicating the presence of algae.

Effluent from the ponds flows to outfall chambers where the pond depth is controlled by stop log weirs. From the outfall chambers, the effluent is conducted via a 12-inch diameter concrete pipe to the Maitland River.

Design data and a diagram of the waste stabilization pond system are appended in Appendix F & G respectively.

OPERATING PROCEDURE

The Division of Plant Operations is responsible for the operation of the water pollution control system including the sewers, the pumping station, the pneumatic lift station and the waste stabilization ponds.

An arrangement was agreed upon whereby the Town of Harriston performs the daily operating duties. During 1966, Mr. D. MacDougall carried out these duties at the pumping station and the waste stabilization ponds. The Operations Engineer supervised the overall operation of the project.

WASTE STABILIZATION POND OPERATION

The 1966 waste stabilization pond operating data is appended in Appendices A and B.

During the year, 88.168 million gallons of sewage were treated in the waste stabilization ponds. The average daily flow was 242,000 gallons. Flows during the spring were high due partially to run-off. Between April 22 and May 21 water was added from a hydrant in order to dilute the sewage and to add dissolved oxygen to the ponds which were approaching septic conditions. Some success was achieved. The three lagoon cells were operated in parallel during the year.

The average raw sewage BOD and suspended solids concentrations obtained from grab samples were 332 ppm and 334 ppm respectively. During the latter part of the year when the industrial wastes were being disposed of by spray irrigation, the concentration of organic matter in the raw sewage decreased markedly. The pond loading during this period was within the design loading of the ponds, whereas the average loading during the year of 28.7 pounds of BOD per acre per day was greater than the design loading of 20 pounds of BOD per acre per day.

The average final effluent BOD and suspended solids concentrations were 17.9 ppm and 27.5 ppm respectively. The average reduction of BOD concentration was 94.6 per cent and of suspended solids concentration, 91.8 per cent.

During periods of high organic loading and high ambient temperatures, odours were experienced at the waste stabilization ponds.

ANNUAL COSTS

The 1966 operating costs and the total costs to finance and operate the water pollution control system are shown in Appendices C and D respectively. The operating and total costs are represented diagrammatically in Appendix E.

The total cost to the municipality during 1966 was $13,996.86. This expenditure includes operating, debt retirement, reserve for contingencies and interest costs. Based on a population of 1650, the total annual cost per capita was $8.48.

The 1966 operating cost was $2,654.17, including an estimated $800.00 for labour. The cost, including labour, per million gallons of sewage treated was $30.09; and, excluding labour, $21.03. The cost per capita per year, including labour was $1.66 and excluding labour, $1.12. The cost per pound of BOD removed including labour was 0.96 cent and exclusive of labour, 0.66 cent. The unit operating costs compare favourably with those of similar water pollution control systems.

1966 OPERATING REVIEW

For the major portion of the year, the waste stabilization ponds were overloaded, creating malodorous conditions and producing a poor effluent. During the period in the autumn when wastes from a local industry were not discharged into the sanitary sewers, the waste stabilizations ponds recovered, producing an acceptable effluent and very little odour.

It has been demonstrated that the greater portion of the waste stabilization pond capacity was used for treating wastes from one industry. It is recommended that the Town of Harriston control the wastes being discharged by local industries.

APPENDIX A

1966 OPERATING DATA

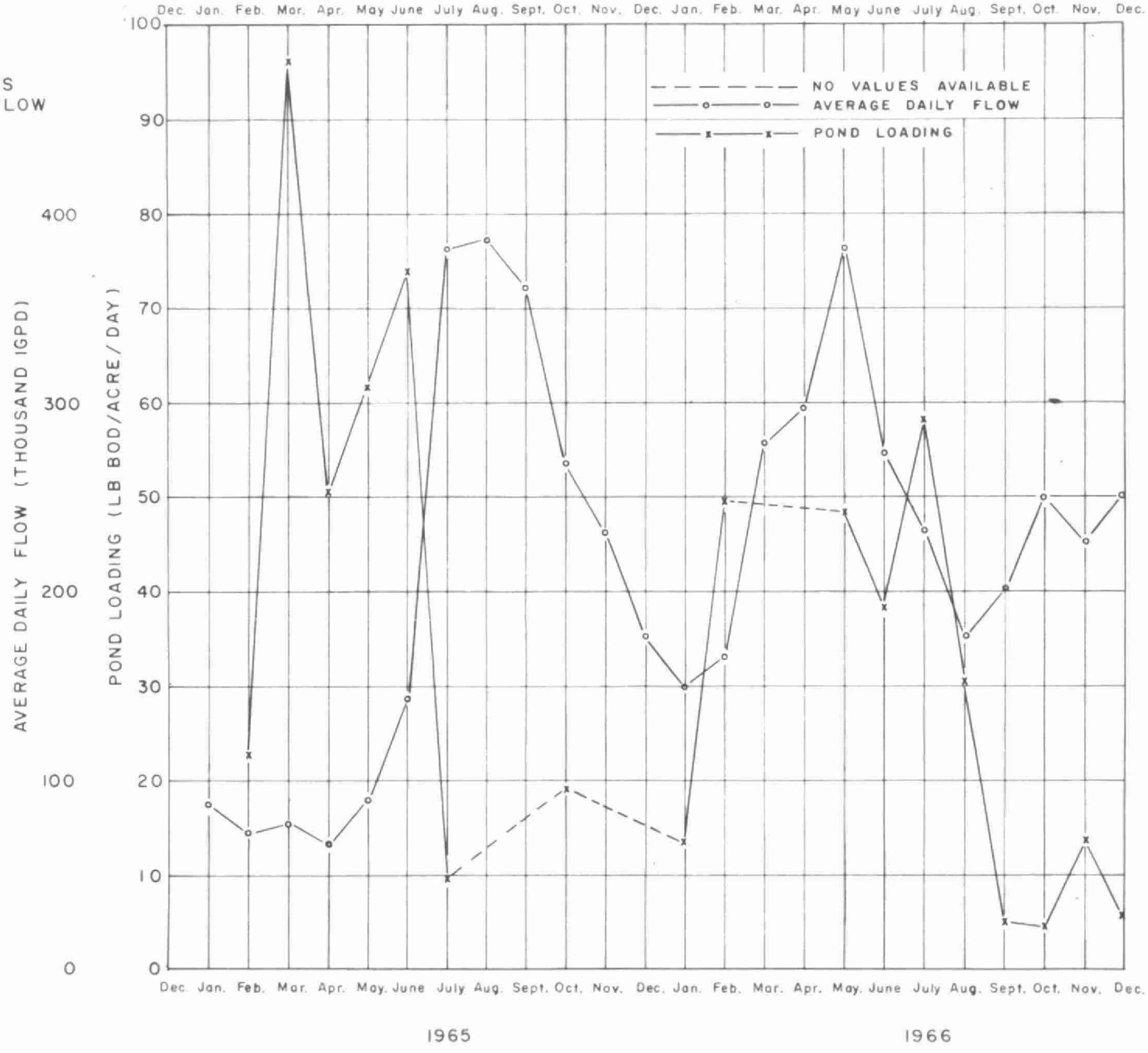
Harriston
62-S-123
65-S-185

MONTH	TOTAL MONTHLY FLOW (MG)	AVERAGE DAILY FLOW (MGD)	RAW SEWAGE		FINAL EFFLUENT		LOADING LB/ACRE/DAY
			BOD (PPM)	SS (PPM)	BOD (PPM)	SS (PPM)	
Jan.	4.645	0.150	250	278			13.4
Feb.	4.610	0.165	840	240			49.5
Mar.	8.645	0.279					-
Apr.	8.890	0.297					-
May	11.553	0.383	365	740	29	36	48.6
Jun.	8.481	0.274	390	306			38.1
Jul.	7.246	0.233	640	536			58.2
Aug.	5.453	0.177	480	460			30.4
Sept.	6.071	0.202	72	184	18	16	5.2
Oct.	7.779	0.250	50	130	22	50	4.5
Nov.	7.007	0.226	175	296			14.1
Dec.	7.788	0.251	60	170	2.4	8	5.4
Total	88.168						
Average	7.347	0.242	332	334	17.9	27.5	28.7

HARRISTON

APPENDIX B

MONTHLY VARIATIONS
1. AVERAGE DAILY FLOW
2. POND LOADING



Harriston
62-S-123
65-S-185

APPENDIX C

1966 OPERATING COSTS

MONTH	POWER	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	TOTAL EXPENDITURE
Jan.					18.73	18.73
Feb.	95.73			2.00		97.73
Mar.	94.38		7.24	2.99	31.92	136.53
Apr.	106.92					106.92
May	100.11			25.00	134.59	259.70
Jun.	104.02				1.34	105.36
Jul.	102.72					102.72
Aug.	96.85			24.42	12.34	133.61
Sept.	86.29					86.29
Oct.	87.57				14.28	101.85
Nov.	101.20	18.19		162.99	62.52	344.90
Dec.	211.59			148.24		359.83
Total	1187.38	18.19	7.24	365.24	275.72	1854.17

Estimated Labour Cost	$ 800.00
Total Operating Cost Including Labour	$2,654.17

YEAR	MG TREATED	TOTAL COST	COST PER MG	COST PER CAPITA PER YEAR	COST PER POUND OF BOD REMOVED
1965*	69.374	1254.34	$18.08	$0.76	$0.55 cents
1966**	88.168	2654.17	$30.09	$1.66	$0.96 cents

* 1965 Cost Figures Exclude Labour Costs

** 1966 Cost Figures Include Labour Costs.
Design Population - 1650

APPENDIX D

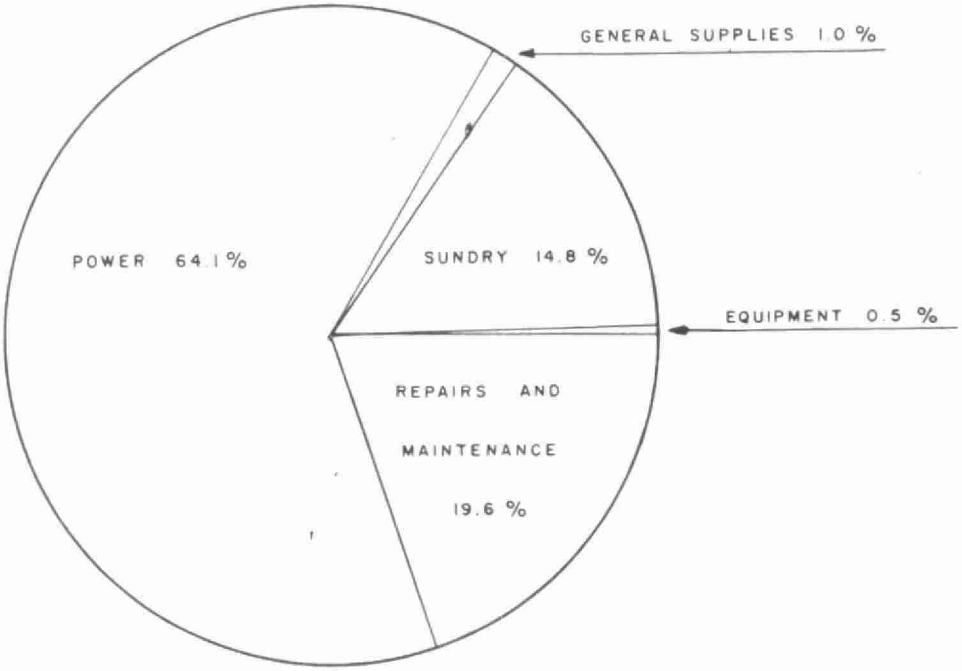
PROJECT COSTS

Harriston
62-S-123
65-S-185

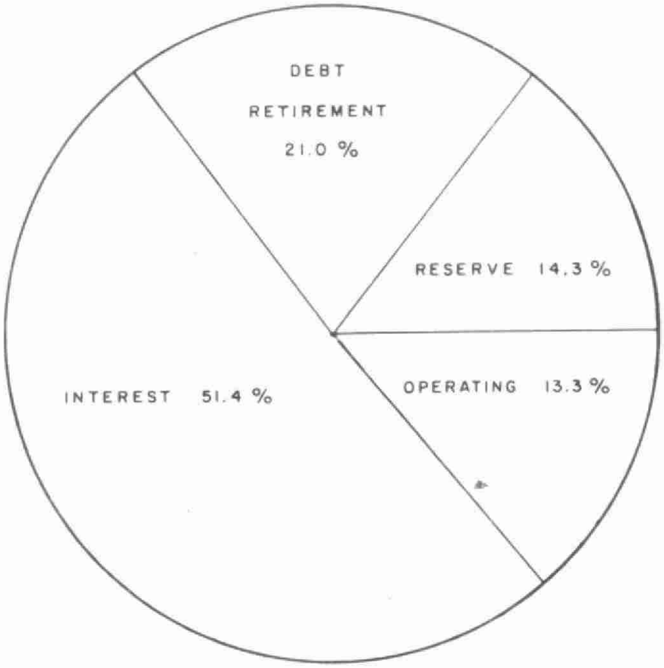
Debt Retirement Balance at Credit (sinking fund) December 31, 1966	62-S-123	$ 5,479.11
	65-S-185	294.15
		$ 5,773.26
Operating Costs (Excluding Labour)		$ 1,854.14
Debt Retirement	62-S-123	2,646.00
	65-S-185	290.00
Reserve for Contingency	62-S-123	1,795.23
	65-S-185	214.00
Interest Charged	62-S-123	5,750.49
	65-S-185	1,447.00
Total 1966 Costs		$13,996.86
Reserve for Contingency Account Balance at January 1, 1966	62-S-123	$ 1,537.77
	65-S-185	Nil
Deposited by Municipality	62-S-123	1,795.23
	65-S-185	214.00
Interest Earned	62-S-123	124.54
	65-S-185	1.46
		$ 3,673.00
Less: Expenditures	62-S-123	123.72
Balance at December 31, 1966		$ 3,549.28

APPENDIX E

HARRISTON



1966 OPERATING COSTS EXCLUDING LABOUR



1966 TOTAL ANNUAL COSTS

Harriston
62-S-123
65-S-185

APPENDIX F

DESIGN DATA

MAIN PUMPING STATION

Type	Robert Morse Corp. prefabricated underground station
Rated Pump Capacities	2 pumps 400 IGPM at 51 ft. TDH
Motors	15 HP
Pump RPM	1150
Location	William Street South of the CNR Tracks

YOUNG STREET PUMPING STATION

Type	Robert Morse Corp. pneumatic ejector station
Rated Capacity	100 IGPM at 18 ft. TDH
Motor	15 HP driving a single stage compressor
Location	Young Street North of the Maitland River

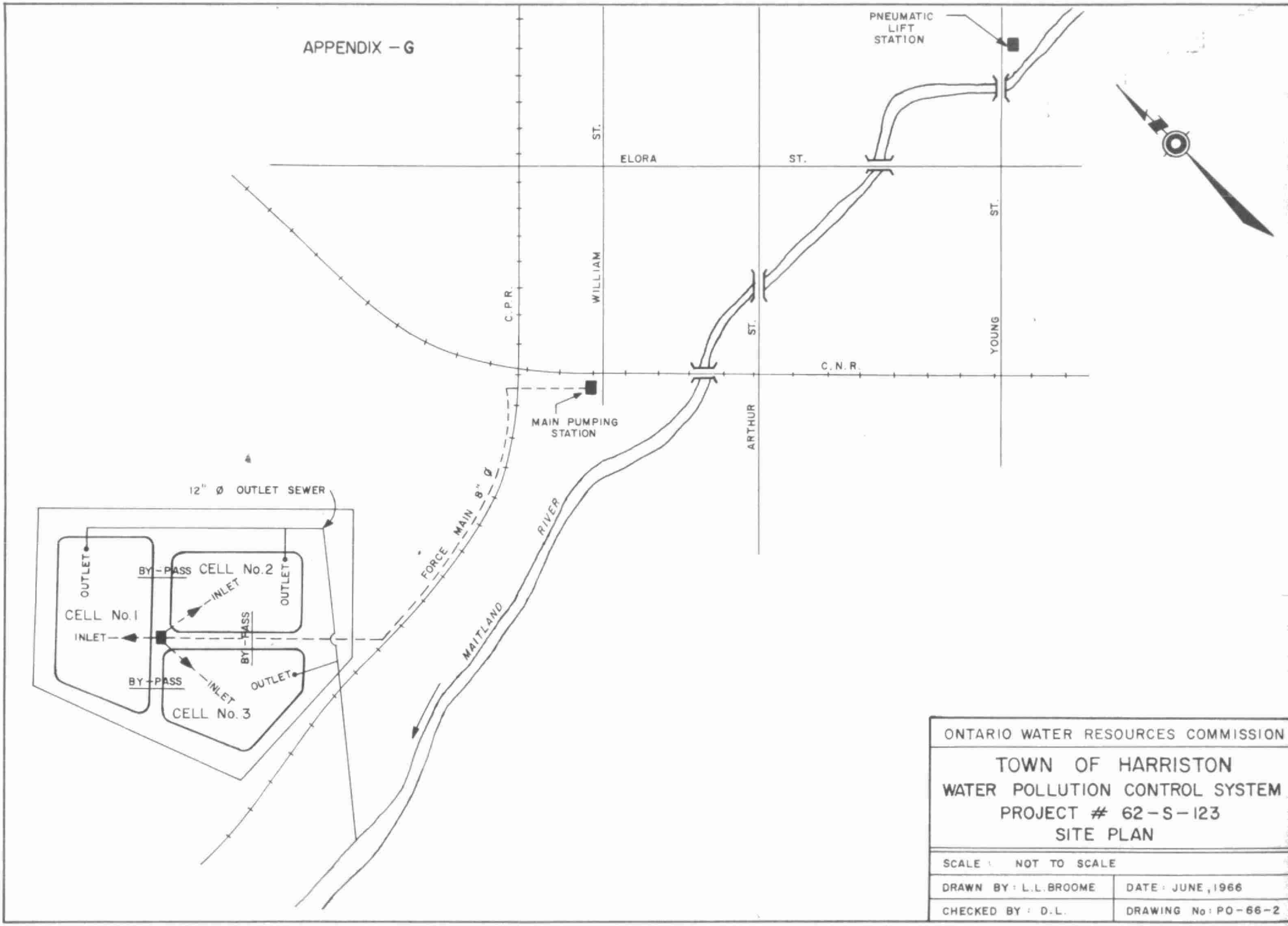
WASTE STABILIZATION POND

Number of Cells	3
Total Area	28 acres
Area Criteria	Domestic Wastes 18 acres Industrial Wastes 10 acres
Design BOD Loading	Domestic Wastes 20 lb/acre/day Industrial Wastes 20 lb/acre/day

SEWERS

Sanitary	
Diameter variance	8 inches to 15 inches
Approximate length	9,400 lineal feet
Forcemain	
Diameter	8 inches
Approximate length	2,300 lineal feet

APPENDIX – G



ONTARIO WATER RESOURCES COMMISSION

TOWN OF HARRISTON
WATER POLLUTION CONTROL SYSTEM
PROJECT # 62 – S – 123
SITE PLAN

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